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PATENT TRADEMARK OFFICE

Docket No.: 2309/OK045

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Hisashi TAKAI et al.

Serial No.: 10/001,886

Art Unit: 1731

Confirmation No.: 3404

Filed: November 16, 2001

Examiner: HALPERN, Mark

For: METHOD AND APPARATUS FOR MANUFACTURING NON-WOVEN FABRIC

MARK-UP FOR AMENDMENT OF APRIL 14, 2003  
PURSUANT TO 37 C.F.R. §1.121

April 14, 2003

Box NON FEE

Assistant Commissioner of Patents  
Washington, DC 20231

Sir:

IN THE CLAIMS:

1. (Amended) A manufacturing method of a non-woven fabric comprising the steps of:

forming a fibrous web on an outer peripheral surface of a circulating wire net transporting belt [circulating];

forming a non-woven fabric by applying water jets to said fibrous web on the outer peripheral surface of said wire net transporting belt for entangling fibers; and

transporting said non-woven fabric [to be opposed] for placement opposite to a forming body including a net having a predetermined pattern and encircling a drum body or a plurality of rolls; and

applying water jets to said non-woven fabric from [the] a side of an inner peripheral surface of said wire net transporting belt or another wire net transporting belt following said wire net transporting belt [for urging] so as to urge said non-woven fabric onto said forming body [for transferring] to transfer said pattern of said [forming body] net to said non-woven fabric, wherein

a mesh of said net is sufficiently coarser than a mesh of said wire net transporting belt.

5. (Amended) The manufacturing method of a non-woven fabric as set forth in claim 1, [which] further comprising the [comprises a drying] step of: [for]

drying said non-woven fabric having said pattern transferred thereto.

6. (Amended) A manufacturing method of a non-woven fabric comprising the steps of:

forming a fibrous web on an outer peripheral surface of a circulating wire net transporting belt [circulating]; and

transporting said fibrous web [to be opposed] for placement opposite to a forming body including a net having a predetermined pattern and encircling a drum body or a plurality of rolls;[,] and

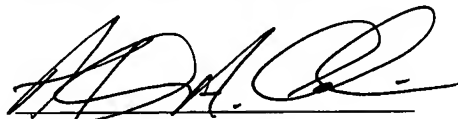
applying water jets to said fibrous web from [the] a side of an inner peripheral surface of said wire net transporting belt [for urging] so as to urge said fibrous web onto said forming body [for entangling] to simultaneously entangle fibers of said fibrous web [for forming a] to form the non-woven fabric and [in conjunction therewith for transferring] transfer said predetermined pattern of said [forming body] net to said non-woven fabric, wherein

a mesh of said net is sufficiently coarser than a mesh of said wire net transporting belt.

10. (Amended) The manufacturing method of a non-woven fabric as set forth in claim 6, [which] further [comprises a drying] comprising the step [for] of:

drying said non-woven fabric having said pattern transferred thereto.

Respectfully submitted,



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## REMARKS

Claims 1-10 are pending. Claims 3 and 8 have been canceled. Claims 1, 5, 6, and 10 have been amended. No new matter has been added by way of this amendment. Reconsideration of the application is respectfully requested.

Claims 1-10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over EP 0972 873 A1 to *Takeuchi* in view of U.S. Patent No. 5,960,525 to *Fleissner*. In response to this rejection, Applicants have amended independent claims 1 and 6 to more clearly define those features of the invention that distinguish it from the cited references. Accordingly, for the reasons set forth hereafter, Applicants respectfully submit that all claims of record now distinguish over the cited references.

EP 0 972 873 A1 to *Takeuchi* is directed to a wet, nonwoven fabric manufacturing process and apparatus for the formation of a fibrous web and treatment with water jets by using conventional wet paper making facilities (see col. 1, lines 1-9).

With reference to Fig. 7 of this publication, *Takeuchi* fails to disclose a net that encircles the roll 5c, as set forth and claimed in amended claims 1 and 6.

On pages 2-3 of the Office Action, the statement is made that:

“Takeuchi discloses a wet process for manufacturing nonwoven fabric (Abstract). In the process, raw material in a solution is supplied from headbox 3 onto an endless wire 2 forming a web W on the outer surface of the wire. Water jets 5 are applied to the formed web on the outer peripheral surface of the wire. Takeuchi also discloses that following the water jets application from the outer peripheral surface, water jets 5b may be applied onto the web from the inner peripheral surface where jets 5b are opposite roll 5c. The formed web is conveyed on wire 7 and then

transferred onto wire 11 where it is put onto drying drum 13 (Takeuchi, col. 5, line 55 to col. 8, line 8, col. 12, lines 6-17, and Figures 1, 2, and 7). *Takeuchi fails to disclose that the roll 5c has a patterned surface.* Fleissner discloses a needling drum 2, having a plurality of openings over which a web travels on wire 3, and onto which water is jetting from beams 15, 16, under vacuum 8, causing a plurality of openings in the web over a pattern (Fleissner, col. 3, lines 4-67). It would have been obvious, to one skilled in the art at the time the invention was made, to combine the teachings of Takeuchi and Fleissner, because such a combination would create a patterned product having hole openings, thus a more marketable product of the design of Takeuchi." (Emphasis Added)

As stated above, *Takeuchi* fails to disclose a net that is placed around the roll 5c shown in Fig. 5, and has the examiner has conceded this reference also fails to disclose that the roll 5c has a patterned surface.

On the other hand, in the embodiments of Figs. 2 and 3, *Fleissner* discloses a needling drum 12' or 2' to which water jets are applied, around which another endless belt 9 is wound (corresponding to the net 33 in the present application). Here, the endless belt 9 is different from a first endless belt 3 (corresponding to the wire net transporting belt 2 of the present application (see Fig. 7)). However, *Fleissner* fails to disclose that the mesh of the endless belt 9 is sufficiently larger (i.e., coarser) than that of the first endless belt 3.

In contrast, in the present claimed invention, the mesh of the net 33 shown in Fig. 6 must be made sufficiently coarser than that of the wire net transporting belt 2 (see Figs. 7 and 8). This is because the ordinary belt (e.g., the belt 2) that is used for collecting fibers thereon during the wet-laid process has very small openings so that a pattern that can be obtained by pressing a fibrous web against the ordinary belt with water jets becomes almost invisible. In the present invention, another net 33 having sufficiently larger openings are

provided with the aim of providing a non-woven fabric with a predetermined pattern in place of embossing or the like.

On the other hand, *Fleissner* has no intention of providing a predetermined distinctive pattern on a non-woven fabric. Therefore, there is no reason to make the mesh of the endless belt 9 of this reference sufficiently coarser than that of the first endless belt 3, as set forth and claimed in amended claims 1 and 6. Hence, the combination of the *Takuechi* publication and the *Fleissner* patent fails to arrive at the present claimed invention, and thus independent claims 1 and 6 are patentable over this combination.

In view of the patentability of independent claims 1 and 6, for the reasons above, dependent claims 2, 4, 5, 7, 9, and 10 are patentable over the prior art.

In view of the foregoing amendments and remarks, this application should be in condition for allowance. Early passage of this case to issue is respectfully requested. However, if there are any questions regarding this Response, or the application in general, a telephone call to the undersigned would be appreciated since this would expedite the prosecution of the application for all concerned.

Respectfully submitted,



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## COMPLETE SET OF PENDING CLAIMS

1. (Amended) A manufacturing method of a non-woven fabric comprising the steps of:

forming a fibrous web on an outer peripheral surface of a circulating wire net transporting belt;

forming a non-woven fabric by applying water jets to said fibrous web on the outer peripheral surface of said wire net transporting belt for entangling fibers; and

transporting said non-woven fabric for placement opposite to a forming body including a net having a predetermined pattern and encircling a drum body or a plurality of rolls; and

applying water jets to said non-woven fabric from a side of an inner peripheral surface of said wire net transporting belt or another wire net transporting belt following said wire net transporting belt so as to urge said non-woven fabric onto said forming body to transfer said pattern of said net to said non-woven fabric, wherein

a mesh of said net is sufficiently coarser than a mesh of said wire net transporting belt.

2. The manufacturing method of a non-woven fabric as set forth in claim 1, wherein said forming body is a member having a plurality of openings, and a pattern of said openings is transferred to said non-woven fabric.

4. The manufacturing method of a non-woven fabric as set forth in claim 1, wherein, in said fibrous web forming step, a raw material, in which the fibers are mixed with a liquid, is provided on said wire net transporting belt.

5. (Amended) The manufacturing method of a non-woven fabric as set forth in claim 1, further comprising the step of:

drying said non-woven fabric having said pattern transferred thereto.

6. (Amended) A manufacturing method of a non-woven fabric comprising the steps of:

forming a fibrous web on an outer peripheral surface of a circulating wire net transporting belt; and

transporting said fibrous web for placement opposite to a forming body including a net having a predetermined pattern and encircling a drum body or a plurality of rolls; and

applying water jets to said fibrous web from a side of an inner peripheral surface of said wire net transporting belt so as to urge said fibrous web onto said forming body to simultaneously entangle fibers of said fibrous web to form the non-woven fabric and transfer said predetermined pattern of said net to said non-woven fabric, wherein

a mesh of said net is sufficiently coarser than a mesh of said wire net transporting belt.

7. The manufacturing method of a non-woven fabric as set forth in claim 6, wherein said forming body is a member having a plurality of openings, and a pattern of said openings is transferred to said non-woven fabric.



9. The manufacturing method of a non-woven fabric as set forth in claim 6, wherein, in said fibrous web forming step, a raw material, in which the fibers are mixed with a liquid, is provided on said wire net transporting belt.

10. (Amended) The manufacturing method of a non-woven fabric as set forth in claim 6, further comprising the step of:

drying said non-woven fabric having said pattern transferred thereto.